BTeV and The Fermilab Program

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DOE review of BTeV

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The Fermilab program

A. The Unification of Forces

B. Electroweak Symmetry Breaking
- Run II of the Tevatron: CDF and D0
- US-LHC and US-CMS
- Linear collider R&D

C. Three Generations of Quarks and Leptons

Neutrino and Lepton Flavor Physics
- The US accelerator-based neutrino program: MiniBooNE and NuMI/MINOS

Quark Flavor Physics and CP violation
- Quark flavor physics experiment to operate at end of Run II: BTeV

D. Particles and the Cosmos
- Sloan Digital Sky Survey
- The Auger Cosmic Ray Observatory
- The Cryogenic Dark Matter Search

Quark Flavor Physics

Y. Grossman at Lepton Photon 2003:

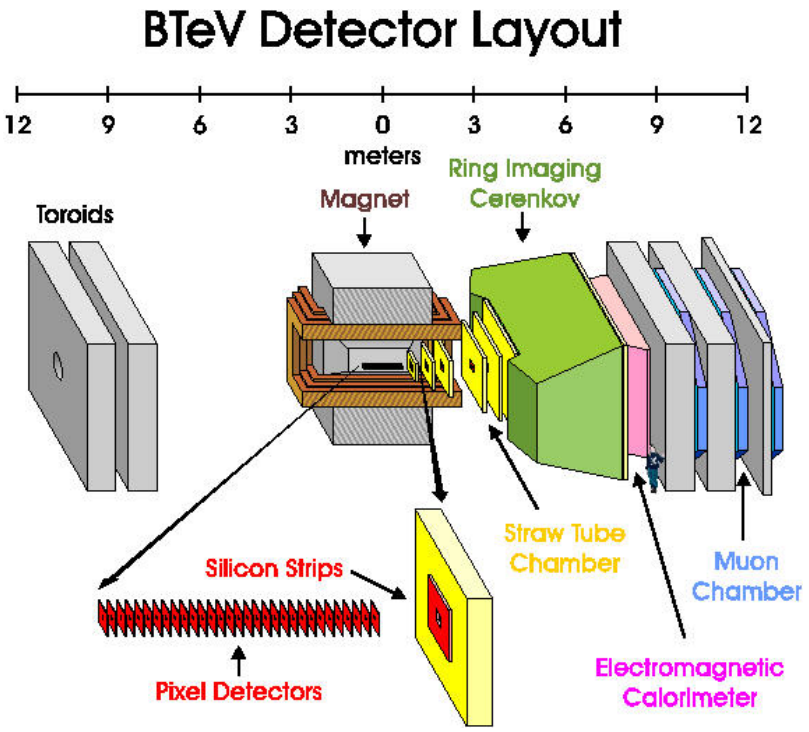
- The Standard Model flavor structure is special
  - Universality of the charged current interaction
  - Flavor Changing Neutral Currents are highly suppressed
- Any New Physics model must reproduce these successful SM features.

Many proposed models of new physics lead to observable anomalies in the mixing and decays of K, B_d, and B_s mesons.

BTeV

- BTeV will have a very broad particle physics program, including charm physics, but the primary motivation is the search for new physics through CP violation in the B_d and B_s systems.

- BTeV represents a breakthrough in designing collider experiments.



PAC on BTeV 6/2000

- "The Committee believes that BTeV has the potential to be a central part of an excellent Fermilab physics program in the era of the LHC. With excitement about the science and enthusiasm for the elegant and challenging detector, the Committee unanimously recommends Stage I approval for BTeV."
- "The Committee believes, however, that the program of measuring a comprehensive set of CP asymmetries in the B_d and B_s systems will not be completed by these (existing) experiments. New experiments will be needed at the end of this decade to provide crucial pieces of information. BTeV has the potential to supply these missing pieces of information and could in fact be the definitive experiment that finally clarifies the picture of CP violation."
- "The Committee also concludes that BTeV will have a physics reach for CP violation studies that extends significantly beyond that of current experiments and those that will exist when BTeV runs."

PAC on BTeV 4/2002

- "Indeed, the BTeV collaboration has responded with a descoping plan that the Committee finds to be well thought out and that preserves the key features that motivated the initial approval in 2000. After reviewing the revised proposal and re-evaluating the experiment in light of additional information that has emerged in the last two years, the Committee once again recommends Stage I approval for BTeV. Although the composition of the committee has changed substantially since 2000, this recommendation is again unanimous."

P5 on BTeV, 10/2003

- "The strength of the BTeV experiment comes from the combination of its vertex trigger with precision mass measurements for both charged and neutral decay modes and excellent particle identification capabilities."
- "P5 supports the construction of BTeV as an important project in the world-wide quark flavor physics area."

FY 2005 DOE Congressional Budget

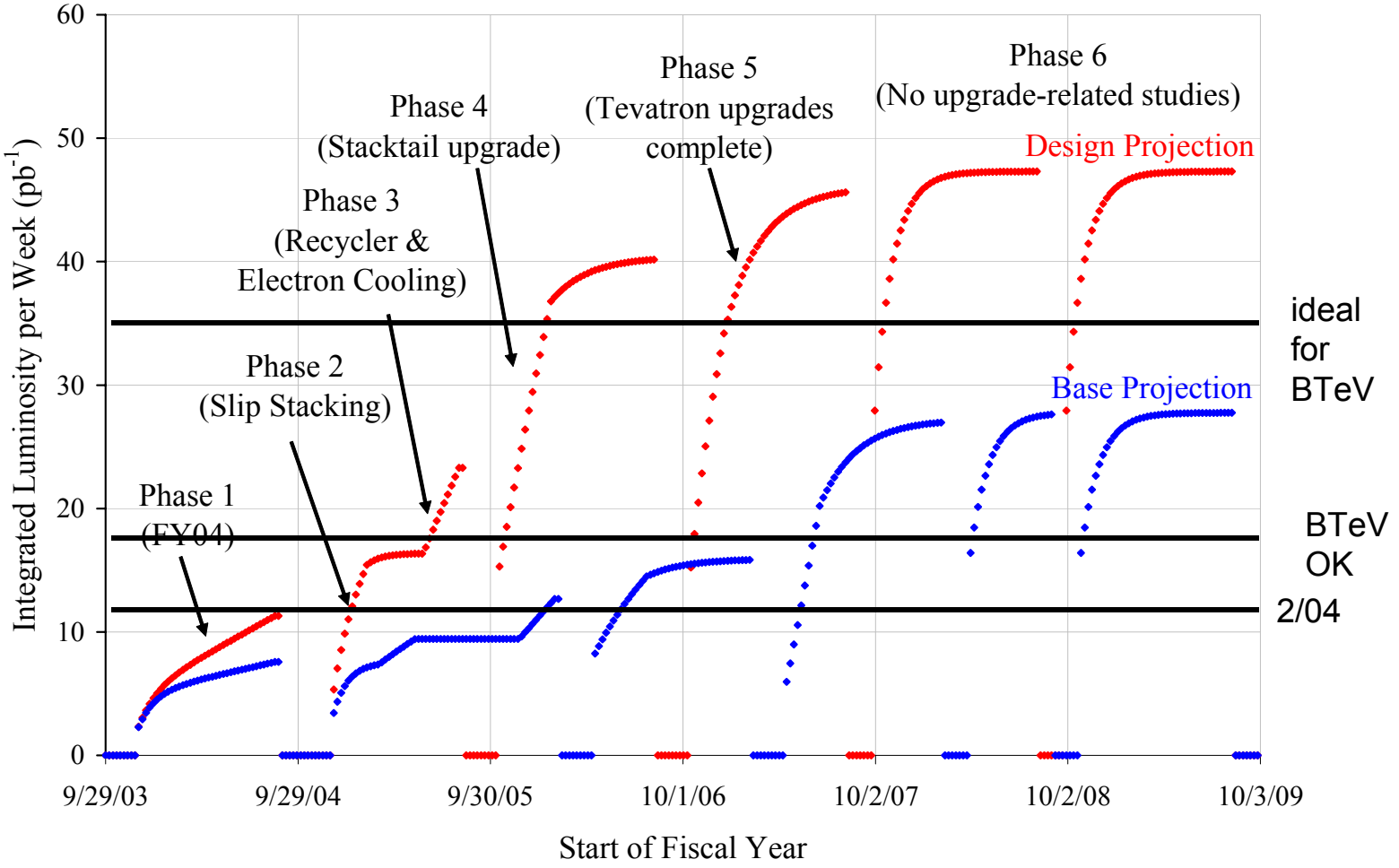
- In FY 2005 we will begin engineering design of a Major Item of Equipment, the BTeV experiment at Fermilab, subject to successful independent cost and technical reviews of the project to take place in 2004.

- This experiment will study CP violation and search for new phenomena in the B meson system with much higher statistics than is possible at the B-factories, including studies of B meson species which are inaccessible to the B-factories.

- The importance of the physics addressed by BTeV has been endorsed by HEPAP and recognized in the Office of Science's Report, "*Facilities for the Future: A Twenty Year Outlook*."

- HEPAP endorsed the P5 report that supported the fabrication of BTeV as the highest priority new project at Fermilab after completion of the Run II upgrades, subject to constraints within the HEP budget.

Run II accelerator goals are more than enough for BTeV.



DOE accelerator review closeout

Luminosity Projections

- Because of progress on Run II upgrade activities since the last review, the committee now views the base goal of 4.4 fb-1 by the end of FY09 as having a good probability of being met or even exceeded.
- Meeting the design goal of 8.5 fb-1 by the end of FY09 remains a very challenging goal.

So what's the bottom line?

- We're very impressed with the progress in the past seven months.
- We have increasing confidence that Run II will be successful.
- We look forward to continued progress toward the Tevatron complex being reliable, and well characterized to serve as a platform for the cutting edge upgrades.

Impact of BTeV on Run II and the laboratory program

- This question was one of those addressed for the DOE operations review on March 16-18.

http://www.fnal.gov/directorate/DOE_Review_TeV_Ops.html

- This was a 3-day review of the laboratory, with subcommittees on accelerator program, research program, business and finance, infrastructure and ES&H, and management
  - 17 committee members, including
    - Jim Siegrist, Howard Gordon, and Roy Whitney on Research
    - Marty Breidenbach, Klaus Berkner, Howard Gordon, and Steve Meador on management
  - You will find a 90-transparency closeout briefing at the website.
- We will discuss our staffing and budget plan for the laboratory over the life of BTeV construction at the management breakout.

Summary

- BTeV has gone through the most rigorous approval process ever, ending in P5.
- It emerged as the highest priority experimental facility to be built at a U.S. accelerator facility over the next several years.
- The laboratory looks forward to this CD-1 review.